

IN THE ABSTRACT

Please delete the current text for the abstract of the disclosure and substitute therefor a new text as follows:

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A method of producing reduced iron pellets including reducing raw material pellets to obtain reduced iron pellets, and rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering.

REMARKS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 4-8 and 23-25 are presently pending in this application, Claims 6-8 having been withdrawn from further consideration by the Examiner, Claims 4 and 5 having been amended, and Claims 23-25 having been newly added by the present amendment.

In the outstanding Office Action, the drawings and the abstract of the disclosure were objected to because of informalities; Claim 4 was rejected under 35 U.S.C. §102(b) as being anticipated by the alleged admission in Applicants' disclosure, Ando et al. (U.S. Patent 3,831,913), Rierson (U.S. Patent 5,076,838) or Babcock et al. (U.S. Patent 2,986,460; and Claims 4 and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable over Babcock et al.

The specification has been amended for a typographical informality.

In response to the objection to the drawings, submitted herewith is a separate LETTER REQUESTING APPROVAL FOR DRAWING CHANGES, submitting for approval changes to Figures 15-27B. Specifically, Figures 15-27B have been amended to show the legend "Background Art."

Claims 4 and 5 have been amended and new Claims 23-25 have been added herein. These amendments and additions in the claims find clear support in the original specification, claims and drawings. For example, Claims 4, 5 and 23-25 are supported by page 24, line 3, to page 26, line 8, of the specification. Hence, no new matter is believed to be added thereby. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually satisfactory claim language.

Briefly recapitulating, Claim 4 of the present invention is directed to a method of producing reduced iron pellets including reducing raw material pellets to obtain reduced iron pellets, and rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering. By rolling the iron pellets as such after being reduced, the reduced iron pellets undergo sintering action, thereby becoming more compacted and thus improving their collapsing strength significantly.¹

The outstanding Office Action asserts that Ando et al. disclose a method of producing reduced iron pellets as recited in Claim 4. Nevertheless, Ando et al. do not teach rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering, as recited in amended Claim 4. Ando et al., on the other hand, disclose that the iron pellets be pre-reduced in the fluidized bed 35, then completely reducing the partially reduced iron pellets in the rotary kiln, and simply discharging the thus reduced iron pellets into the cooler 38 via the hopper 24. Therefore, the method recited in Claim 4 is distinguishable from Ando et al., and thus is not believed to be anticipated thereby.

Rierson and Babcock et al. disclose a process for direct reduction of materials in a kiln and a production of iron, respectively. However, neither Rierson nor Babcock et al. teach

¹ Specification, page 25, line 17, through page 26, line 8.

rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering, as recited in amended Claim 4. Although Rierson discloses the induration zone 24 for indurating the pellets, according to Rierson, the pellets from the oxidation zone 14 are first heat hardened in the induration zone 34 prior to, not after, brought into intimate contact with any reducing agent. Like Ando et al., Babcock et al. only disclose that after reduction, the iron pellets be cooled down and quenched. Thus, the method recited in Claim 4 is also distinguishable from Rierson and Babcock et al., and thus is not believed to be anticipated thereby.

Likewise, page 1 of Applicants' specification, alleged as an admitted prior art in the Office Action, describes a conventional method of reducing irons in which, after reduction, the iron pellets are simply cooled down, thus not rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering, as recited in amended Claim 4. Thus, the method recited in Claim 4 is clearly distinguishable from the conventional method described in Applicants specification, and is not believed to be anticipated thereby.

Because none of Ando et al., Rierson, Babcock et al. and the alleged admitted prior art discloses the rolling step as recited in Claim 4, even the combined teachings of these applied references are not believed to render the method recited in Claim 4 obvious.

For the foregoing reasons, Claim 4 is believed to be allowable. Furthermore, since Claims 5 and 23-25 depend directly from Claim 4, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 5 and 23-25 are believed to be allowable as well.

In view of the amendments and discussions presented above, Applicants respectfully submit that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

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IN THE SPECIFICATION

Please replace the paragraph at page 7, lines 18-26, with the following text:

--Figs. 24 and [24] 25 show the pellet charging machine, which comprises a receiving portion 516 of the raw material pellets, an inclined plate 516b for guiding the pellets discharged from the receiving bin 516, and a pair of partition plates 517 and 518 for controlling the thickness of the pellet laminate layer. The height of the opening H3 at the bottom of the receiving portion 516, the intervals H2 and H1 under the partition plates are set as $H3 > H2 > H1$. The pellets in the receiving bin 516 is supplied onto the rotary bed 512 after passing through intervals of H3, H2, and H1 which becomes sequentially smaller.--

IN THE CLAIMS

Please amend Claims 4 and 5, and add new Claims 23-25 as follows:

--4. (Amended) A method of producing reduced iron pellets [by the steps of]
comprising:
reducing [the] raw material pellets to obtain [obtained by cooling the] reduced iron pellets; and [after reducing the raw material pellets of the mixture of a iron oxide powder and a carbonaceous material powder, the method further comprises a step of:
applying]

rolling [to] the reduced iron pellets [while being maintained within the] at a temperature [range of] ranging between 800 [to] and 1200°C sufficiently such that the reduced iron pellets undergo sintering.

5. (Amended) A method of producing reduced iron pellets according to claim 4, wherein said rolling step comprises rolling of the reduced iron pellets [is applied] for more than 3 minutes and less than 20 minutes.

23. - 25. (New)--

IN THE ABSTRACT

Please delete the current text for the abstract of the disclosure and substitute therefor a new text as follows:

[Several methods and production facilities are provided in order to solve several problems encountered in conventional methods and facilities for producing reduced iron by reducing raw material pellets of a mixture of an iron oxide powder and a reducing material powder in a rotary bed-type reducing furnace and by melting the reduced iron in a sealed-type electro-blast furnace.

Re-oxidation of reduced pellets of the mixture pellets is prevented by introducing into a rotary bed-type reducing furnace a reduced gas generated in an electro-blast furnace. In addition, an improved mechanical strength of reduced pellets after direct reduction is attained by applying rolling action to the reduced pellets.

A few method and facilities are provided for reliable utilization of wet mixture pellets and a preferable compositions of binders for forming the raw material mixture are selected. A novel charging device for charging raw material pellets is developed which is capable of

charging the pellets on the rotary bed as a uniform layer formed by piling one or more pellets.]

--A method of producing reduced iron pellets including reducing raw material pellets to obtain reduced iron pellets, and rolling the reduced iron pellets at a temperature ranging between 800 and 1200°C sufficiently such that the reduced iron pellets undergo sintering.--